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An attempt to assess stimulus conditions in the environment of the infant in the first year of life and the impact of these stimuli on his adaptive and social behaviors was presented. Infants were observed in four child-rearing environments -- residential, kibbutz, single-child family, and multiple-child family. Under theoretical orientation, these differences would imply different outcomes, for instance in patterns of social or attachment behaviors.

The method of surveying and observing these four different environments was explained. Possible differences among the environments that might account for differences in infant social behaviors have at least two overlapping trends. The first trend was that of environmental richness in the simple sense of availability of stimuli. The second trend was that of types of learnings that could occur differentially in the child-rearing environments, depending on the sequence and timing relationships occurring between stimuli provided and behaviors.

It was expected that this analysis would be useful for understanding the psychological processes underlying child development.

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STIMULUS CONDITIONS, INFANT BEHAVIORS, AND SOCIAL LEARNING IN FOUR ISRAELI CHILD-REARING ENVIRONMENTS: A PRELIMINARY REPORT ILLUSTRATING DIFFERENCES IN ENVIRONMENT AND BEHAVIOR BETWEEN THE "ONLY" AND THE "YOUNGEST" CHILD

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INTRODUCTION

The data analysis of the study we shall describe is in process. Hence, it will here be possible to elaborate primarily on our objectives and method, and to present only illustrative findings. Employing entire-day observations of infants in everyday settings, our study represents an attempt to assess stimulus conditions in the environment of the infant in the first year of life and the impact of these stimuli on his adaptive and social behaviors. The stimuli assessed are provided for the most part in interaction with adults, in and out of caretaking. Infants were observed in four child-rearing environments, namely residential institution, kibbutz, single-child family and multiple-child family. These appeared to represent meaningfully different contexts for early development and learning. The diverse environments could be assumed to provide to children different types, amounts, and patterns of stimuli, and therefore differences in opportunity, including that for various learnings to occur. Under our theoretical orientation, these differences, as antecedents, would imply different outcomes, for instance in patterns of social or attachment behaviors. We embarked on this program for reasons which reflect the interaction between our research orientation and the extraordinary opportunity offered for this class of research in Israel.

We have preferred generally an experimental approach to the study of elementary human behaviors, such as responsiveness to stimuli, smiling, vocalizing, and the

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stimulus conditions that control them, as well as to the more complex integrated systems made up of basic behaviors like these and their relations to or control by stimuli. We might term the latter systems "information processing," "adaptive intelligence," "dependence," "attachment," and the like. This approach of manipulating systematically stimulus conditions while keeping other conditions constant and of charting effects in selected behaviors (at one or at a sequence of time points) is suited particularly to the isolation of principles governing given stimulus-behavior systems. The necessary step remaining in this case would be to generalize to life settings the relationships found. This could be done by assumption or through a research involving systematic observation carried out in life settings for the purpose. The alternative approach is the one we have found it expedient to follow in the study being reported, given the unique opportunity in which we found ourselves in Israel. It was to observe directly in the life setting the relationships holding between stimuli and behavior. To be complete, this approach would require in addition assumptions about underlying principles that could account for the obtained relationships. Alternatively, it would require a concomitant experimental program in stripped-down contexts to determine definitively the nature of the principles underlying the relationships observed between variables in the life-settings.

It is our conviction that either of the above research approaches is preferable to one in which some gross referent of environmental conditions, operating through long time periods, like that of "age," "sex," "environment" or "culture" group, "social class," or "sibling order" is taken to index aspects of environmental stimulation or experience that are thought to be relevant determinants or antecedents of particular behavioral outcomes, e.g., in smiling, vocal, or intelligent behavior. Due to their remoteness from the level of analysis required, there would be no conclusive way of selecting that explanation which best orders a relationship between any such variable and some behavior outcome from among the many psychological explanations possible. (Even so, such gross indices of the independent variables might

sometimes be of some use, as in the first stages or as a by-product of an empirical analysis under some reasonably articulate theoretical model.) For a psychological analysis it would be necessary to coordinate the levels of these expedient independent variables with differential patterns of events at the level of stimulus and response. This required analysis would encompass the identities, frequencies, variety, and range of stimuli provided, and for an analysis of process, their sequential and timing relationships with such behaviors as smiling which could constitute opportunities for/ those responses to become conditioned according to the classical or operant paradigms.

We recall that in earlier studies of child-rearing environments the tendency has been to define stimulus and response variables in global terms, and often less at the psychological than at the sociological level of analysis (e.g., in terms of caretaker role descriptions). These definitions have sometimes been in terms of gross abstractions operating through rather long time-spans for the stimuli provided by behaviors of the environment (e.g., "nurturance," "acceptance") and for behaviors of the child (e.g., "dependence"). These gross variables in turn might be inferred from such remote sources as parent interviews, questionnaires or projective tests, some of which might be administered years after the occurrence of the parent-child interchanges being assessed. The long-term aspects of such gross variables necessarily would limit emphasis on the process of interaction between environmental stimuli and child behaviors. At best, there might be implied in such variables details of the interaction process, including the immediate responses of the child to stimuli provided by a behavior of the environment as well as the environment's responses in turn, and so on through entire interaction sequences. This is especially the case when investigators have worked under the aegis of a theory of process, e.g., a learning-behavior theory. In such cases, however, as the process theory implies a use of variables (like those listed in the preceding paragraph) which would permit a direct analysis of process, the gross long-term variables can serve the theory but poorly, and the theory, in turn, can do little more than point, in an indeterminate way, to some

possible ways of ordering the
/relationships found among the gross variables. Hence, the purpose of neither research nor theory is served by this discrepancy between the levels of specificity of research variables and theoretical process conceptions.

In this context we felt a need for the direct observation of functional environmental events which could be described at the "thing" language level to carry a minimum of surplus meaning. Many of these stimuli would be provided by the behaviors of people, e.g., caretakers. Catching the sequential order of these stimuli and behaviors would permit the analysis of the process of interaction between the infant and his environment, which in turn would permit a functional analysis, in detail, of the stable dependencies between the behaviors of the infant and those of his environment, as well as of the formation of these dependencies. We were fortunate to be residing for a period in Israel, where a range of natural "laboratory" conditions was available for observation. The variety of Israeli child-rearing conditions included residential institutions of the type which have been disappearing in the United States and the kibbutz in which professional caretakers and parents divide responsibility for rearing the child. Kibbutz child-rearing has been the focus of some research, more speculative than systematic. For these reasons, we felt we were in an almost perfect situation to attempt a psychological description of child-rearing conditions, in terms of assumptions of our approach to social learning (see, e.g., Gewirtz, 1961). Hence, this study represents a beginning attempt to describe at the required level of analysis the functional environment operating on the developing child insofar as its impact in behavior, both immediate and long term, is concerned. At the same time, the cataloging of these stimulus conditions would define differences between child-rearing environments in psychologically meaningful terms.

METHOD

Sample. Our sample was made up of about 110 infant subjects (Ss) distributed among four age groups (8, 16, 24, and 32 weeks) in the four environments, residential institution, kibbutz, single-child family, and multiple-child family. The "Only"

and "Youngest" children of the two last listed environments lived in cities and were, in the Israel context, middle-class. The numbers of Ss in each environment-age group are proportional but not equal, with cell frequencies ranging from 5 to 20 Ss. About twice as many kibbutz Ss as those of any other group were observed (including 8 girls). All other Ss were males.

Each S was observed for a full day, typically divided into two sessions on successive days. After a half-hour habituation period, an afternoon observation was made on the first day. On the average, each S was observed for 12 hours, which ran from morning waking to evening sleep, if possible. S was the focus of the observation throughout the entire period; the woman observer (O) moved with him from room to room, or followed him on his daily outings, as necessary. But at no time did she respond to him or initiate interaction with any other person in his environment. Contact with the family (or institution) was established prior to the actual observation period, and the mother (and/or the caretaker in charge) was generally told only that we were interested in following closely the everyday behavior of a group of healthy infants. No indication was given about our interest in the behavior between adults and the S. Caretakers were asked not to interact with O, and to behave toward S as they would ordinarily, for what they did could not interfere with the observation.

Naturally, we tried to control as many variables as we could in the selection of the sample. Only normal healthy infants were observed, and even those suffering from minor or temporary distresses (e.g., reaction to a vaccine) were excluded. Observations were made only in those town families in which the mother (rather than a regular maid or female relation) was her son's major caretaker and was <u>not</u> employed outside the home. Observations were carried out on weekdays only, to avoid confusion of changed routines and work-distributions among parents and caretakers. These selected details should suffice to provide a preliminary picture of our thinking about sampling of Ss and times for observation. There were of course factors which added to the variability among our Ss, over most of which we had little control. For

example, when necessary we could begin an observation in an institution or in a kibbutz at 5 a.m., but could not enter a town family's home until 7:30 or 8 a.m. without distorting markedly the normal morning routine of the entire family. Thus, since we adjusted our hours to interfere minimally with the "natural flow" of the observation, we ended up with differences in the hours of observation among the environments. We are devising weighting procedures to control for some of these differences among groups.

Observation Categories and Method. Each of our 5 Os was equipped with a spiral booklet, the pages of which were each marked off into five sections corresponding to 30-sec. time blocks, and a portable timer which was set to "blip" into O's earphone every 30 seconds. O recorded her observations continuously, moving one block down in the booklet each time she heard the signal. The 30-sec. blocks were numbered consecutively from 5 a.m. to 9 p.m. (the earliest and latest observation hours for the total sample). In this way it was possible to keep a complete "flowing" record of all events (without resorting to time sampling), and, at the same time to know the actual time of day for each occurrence.

The observation categories which were recorded can be divided into three major classes, Background, Setting, and Behavior. a) Background categories refer to all social and non-social events occurring in S's vicinity which are not immediately oriented towards him and which provide much of the context for S's behaviors; e.g., "mother enters," "S's caretaker converses with another caretaker," "a neighboring infant cries," and "father leaves room." b) Setting categories characterize general caretaking themes involving S at any time; e.g., "feeding," "bathing," "changing diapers," "being taken out for a walk," and "sleeping." This class included also the designation of S's location, when different from his "home" room. c) Behavior categories represent the central and also the richest class of observation. They contain all discrete acts emitted by the S together with all acts explicitly directed towards him by any person (including children) in his environment, and the interactions

between S and other persons. The Behavior categories are comprised of three subgroups. These include: 1. S's acts, e.g., "S smiles at father," "S vocalizes a vowel sound," "S reaches for a toy," "S looks at O," "S follows mother with his eyes," "S manipulates his fingers," "S fusses," "S cries"; 2. Other persons' acts, primarily those of caretakers and parents, including, e.g., "mother touches S," "mother talks to S," "mother picks up S, hugs, looks at, smiles to, kisses, or restrains him, or puts a nursing bottle into S's mouth"; 3. Interaction, referring to a stimulus-response sequence or interchange between S and another person, in which the time elapsing between the acts of the one and the acts of the other does not exceed two seconds. Any one of the acts of S or other persons might be involved in such a chain. Behaviors in interaction are scored and characterized separately from isolated behaviors. O's training was directed toward catching behaviors in, and the characteristics of, interaction which occupies a central theoretical focus of this study.

Os were trained thoroughly, for several months, in the definitions of the categories as well as in observing in a variety of situations before they were permitted to begin formal observations. The check for observer reliability consisted of having pairs of Os, working independently, watch given Ss during particularly intense periods. They used the same timer signals, and attempted to record the same events. Subsequently, a block-by-block comparison of their records was carried out. Degree of agreement between the observers was calculated by the usual methods, taking into consideration the types of disagreements of omission and comission. The emphasis during the reliability training was on interaction sequences, with particular stress on the correct identification of the order of actors and of responses in the chain, as well as on response content. We have employed several scale-like levels of agreement on interaction, ranging from the most general case of agreement on the identities of the actors initiating and terminating the interaction, to the most specific case of agreement on the precise order and content of the categories. Even though there is no commonly agreed upon criterion of reliability, especially for

interaction sequences, and considering the difficult task set for the Os, we have attained what we take to be high levels of agreement among Os about the essential features of the observation. We have calculated in detail the reliabilities, both for isolated categories and for interactions, but shall not present them here.

A final word now about the current status of our method. As must be typical of researches of this type, when we embarked upon this study in Israel in 1961, we did not fully appreciate its scope. It was only after we began to examine the material which had been collected for the purpose of planning the analyses, that we came fully to realize the enormous amount of differentiated data we had, as well as the complexity of the variables involved and of the analyses required. It became clear that only a digital computer operating as an enormous sorter would make possible the many and intricate analyses required for us to make maximal use of the data amassed. Hence, since our return we have been concentrating our efforts in that direction. The observation categories have been adapted to a mnemonic alpha-numeric computer code, and the coded records are now being entered on punch cards. At the same time we have been developing computer programs for the desired analyses. Our basic observation unit of the 30-second time block is represented by one punch card (and by additional cards in the rare case where the information to be punched would require more than 80 columns). In addition to identification codes for S, time of day and a continuation symbol, each card may contain one or more of the following: 35 codes for designating persons (as actors or objects of acts); 20 setting and location codes; 65 adult act and 45 S act codes; 5 S activity level codes; and 3 unique code classes to characterize interaction sequences. A large number of combinations of these codes may appear on each of about 1100 cards (after eliminating sleep cards) which cover a typical S's day, for about 110 Ss. Aside from programming the required analyses, which is time-consuming and intricate enough (e.g., for interaction sequences), we are told that our analyses might require a great many hours of a large computer's time, and that we could be provided with results sufficient to keep us occupied for years to come. You can see why we are a bit apprehensive at this point.

SOME OBJECTIVES OF THE ANALYSIS WITH ILLUSTRATIVE DATA

Now that we have summarized our method, it will be easier to describe our specific objectives in detail, and to give some examples which can illustrate our approach. Our conceptual orientation for possible differences among the environments that might account for differences in infant social behaviors has at least two overlapping trends running through. Each trend is more a different focus for the same phenomena than an independent aspect of them. The first trend is that of environmental richness, in the simple sense of availability of stimuli. Relevant here would be such aspects of the stimuli provided as their range, types, variety, frequency, novelty, and complexity. Available stimuli could elicit or evoke selected responses, or they could reinforce them. The second trend is that of <u>types of learnings</u> that could occur differentially in the child-rearing environments, depending on the sequence and timing relationships occurring between stimuli provided and behaviors.

But even before we deal with the first trend, or focus, it seems useful to establish a <u>structural</u> frame for the conditions of the infant's environment (and for the infant's behaviors) which would determine or qualify for S the meaning of the stimuli which impinge on him. The abundance, novelty, or other qualities of the provision of stimuli must be judged relative to an infant's baselevel of experience, which would be a function in great part of caretaking maintenance schedule. For the younger infant, this schedule is the major feature of the structural frame. Thus, our first step is to describe a representative day for apparently typical infants in each environment, emphasizing such structural features as caretaking <u>schedule</u> and the availability of persons, i.e., Setting and Background. There would be included, for example: the frequency, duration, and time of day of feedings, sleep, and play periods with an adult during the day; whether S is diapered or dressed at fixed periods or as frequently and irregularly as S's demands require; and the extent to which S is confined to his room and crib. Of no lesser importance are the features characterizing the <u>social</u> environment of typical infants. These would include: the identity and number of different persons who enter his room during the day, the

purpose and duration of their visits, the association of particular persons with specific caretaking acts, and so forth. As far as we know, even a simple minute-by-minute log of such elementary ecological themes which constitute the context and limits for the stimulus conditions impinging on the infant has never been carried out effectively. It has not been attempted for the child-rearing conditions of the kibbutz, which have aroused so much curiosity because they seem so different from our conception of stimulus conditions in the modal middle-class nuclear family. Indeed, such a structural analysis has not been attempted even for the middle-class family with which all of us are so familiar.

A pertinent example here is our observation that quite a few 2- and 3-month-old institution infants emptied their milk bottles in 2 to 3 minutes, in contrast with the much longer feeding periods among their middle-class family peers. Such elementary structural differences in maintenace conditions can mean much when we consider that the opportunities of institutional infants and of many family infants for contacts with adults are almost completely limited to the periods of instrumental caretaking, as during feeding. Thus, also, an institutional child may actually see and have contact with many more people who come into his vicinity during the day than does the only child of a middle-class family. Our point here is that an ecological description in terms of caretaking structure and schedule is a necessary first step for any evaluation of the effective functioning of environmental stimuli for behavior. Our method of observation should enable us to construct the required contextual picture.

The illustrative data presented in the tables that follow are taken from the records of two middle-class family infants, one an "only child" the other a "youngest child" having a three-year-old sister. Otherwise, these Ss are remarkably similar in demographic characteristics and in the conditions of observation, which were the sole bases for the selection of their records: both were boys, 32 weeks old; their parents were of the same occupational level, and lived in apartments in Jerusalem; both were observed by the same O, and for the same total time, if we exclude sleep

time. The summaries presented are based on hand-tally operations. No definitive generalizations about "Only" and "Youngest" children should be drawn from the data of such arbitrarily selected cases, for without summarizing the results for all Ss in the relevant environment and age groups (for which we are not yet quite ready), it is impossible to determine how representative this pair of records actually is. We note only that these two family Ss did not seem to be atypical in any way, and that the differences seen between their structural environments and their behaviors are, in the main, plausible.

In the context of our earlier points about the limitations inherent in employing gross independent variables, a few words are in order on why we selected these two sibling-status groups. First, one of our purposes is to define these gross sibling-status conditions in terms of the environmental conditions we think they index (correlate with) so imprecisely. Our focal interest remains the stimulus conditions themselves. Second, these sibling-status groups can help us to sample what we think are widely spaced points along the postulated dimension of (patterns of) stimulation provided to children. The environmental heterogeneity introduced by this sampling procedure could facilitate our analysis of functional stimuli, and the conditions under which they have differential impact on behaviors. And, third, of our four Israeli environments, these two sibling-status conditions are the only ones which appear also to be represented in a similar form in western countries. Hence, as our listeners would be familiar with such sibling conditions and their implications for the child, they would have a reference basis for evaluating the possibilities of our method and the plausibility of our preliminary findings (by "triangulation" as it were). Apart from these bases, our tactical reason for comparing the two middle-class town family environments was this: if we would find differences in the direction of our expectations on the variables that should illustrate our assumptions, between Ss from two most similar of our four environments, then we could assume plausibly that even greater differences would hold for groups of Ss representing even more diverse environments.

The summaries of Setting and Background information presented in Tables 1 and 2 can begin to illustrate the point we have made about the structural caretaking description as the context for stimulation and behavior. In Table 1 are seen some striking similarities in the schedules of the 2 Ss: 1) both Ss were awake for an almost

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Insert Tables 1 and 2 about here

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identical period; 2) caretaking was provided solely by the Ss' mothers, with no marked difference in the frequency and duration of Feeding, Diapering and Dressing periods; and 3) if the Outing periods of the "Youngest" S is disregarded, an identical total time period (506 and 510 min.) of being cared for by their mother through the day results for both Ss. The Background similarities shown in Table 2 are: 1) an equivalent period for both Ss (166 and 170 min.) in which they are awake alone in the room; and 2) the total amount of time spent by the mother in her son's room is, again, very similar for both Ss.

These similarities serve to put into relief some of the differences between the Ss' environments. Thus, Table 1 shows no play periods between the "Youngest" S and his mother in contrast to 6 (brief) play periods between the "Only" S and his mother. (A single 2-minute play period between the "Youngest" S and his sister is not shown in Table 1, nor is a 3-minute play period between the "Only" S and his father.) Other minor differences in the Settings also "make sense" in terms of our expectations. For example, the "Youngest" S slept half as long as the "Only" S, possibly due to his sleeping conditions not being as sheltered as those of the "Only" S. Also, the possibly busier and more experienced mother of the "Youngest" S might let him handle some food by himself (Eating Setting), or neglect to bathe him for a day.

Further interesting differences emerge in Table 2. Each mother spent a total of between $4\frac{1}{2}$ and 5 hours in her son's presence during the day. Still, the mother of the "Only" S made twice as many visits, and of these, half were short "peeks," i.e., of one to two minutes in duration. In addition, the total period she spent alone in the room with her son when he was awake was 5 times as long as the equivalent period spent by the mother of the "Youngest" S alone with her son.

Our next objective represents a further step in the direction of a psychological specification of the infant's day. We shall add to the structural aspects previously described the identification of selected behaviors of environment and of child which occur during the "typical" day. We intend to catalog the types, frequencies and rates of stimuli originating in the acts of persons which are explicitly directed towards S, when different persons do enter S's environment. Thus, under this heading we are interested whether there is a systematic trend in the relative frequency of visual, auditory, or tactile stimuli to which infants are exposed, whether fathers talk more while mothers touch more, whether there is more social stimulation during bathing than during feeding, whether there is more physical contact between caretaker and infant in one environment than in another, and whether the adults' response patterns toward the infant are different during a caretaking period from a "pure play" situation in which an adult's presence is clearly not necessary for the infant's survival. Similar to this catalog of all adult acts, we shall seek in the same way to catalog selected responses emitted by S, especially those directed towards persons in his environment. For example, we would want to establish various rate measures as developmental indices, but also as related to the stimuli provided by the immediate presence of various persons (and their identities), or as related to the duration of absences of persons in the vicinity.

To illustrate this type of analysis, Tables 3 and 4 present summaries of such selected acts. Table 3 presents the incidence of talking and smiling by different adults to S, and Table 4 presents the incidence of vowel vocalizations and smiles by S. A number of trends are seen from the distributions of adult responses in

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Insert Tables 3 and 4 about here

Table 3. Mothers and other persons talk to Ss more often than they smile to them. Further, many more talk and smile responses are directed to the "Only" child than to the "Youngest" child, by all persons but especially by their mothers who interacted most frequently of all. In addition, in interaction the "Only" child's mother may

have smiled somewhat more (.37) than the "Youngest" child's mother (.23), in frequency relative to talking responses. The "Only" child's mother exhibited more responses, primarily vocal, outside interaction (i.e., that received no reply from S) to her child than did the "Youngest" child's mother. The implications for differences in interaction sequence patterns will be examined further when we consider Table 5.

We see in Table 4 that both Ss smiled more frequently than they vocalized vowels within interaction, which interestingly is the opposite of the adult pattern, and that both exhibited more vocalizations than smiles when with adults who were not interacting with them, and when they were each alone. This differential pattern may indicate, among other things, that at 8 months the smile is relatively more under social stimulus control than is the vowel vocalization. Further, both in and out of interaction the "Only" child exhibits more numerous smiles and vowel vocalizations than does the "Youngest" child. It is possible that the former is responding more than is the latter to the social stimuli provided by the presence of the observer. Further, vowel vocalizations, especially those repeated with minimal pause between successive instances, are more frequent outside of interaction than in it, for both Ss, provided an adult is present. When adults are absent, the "Only" S emits his repeated vowels at a slightly decreased rate, while the "Youngest" S's rate drops dramatically. Again, the greater incidence of these behaviors of the "Only" S might be due to his greater sensitivity to O's presence.

We have illustrated two of our objectives, determining the structure or frame of the typical caretaking day and cataloging behaviors of both environment and infant. Similarly, the tables have presented illustrative summaries within categories ("vertically"), and have only implied the complicated interrelationships among events occurring simultaneously in the Background, in the Setting, and in the Behaviors of S and others. Our objectives are being presented separately only so that they might be clear, for in fact there is much overlap and interdependence among them. We are even now working on ways to assess these contingencies as the central focus of our study. Some of our preliminary conceptions are illustrated in the next section.

The third of our objectives involves the analysis of interaction sequences. This represents one of the theoretical foci of the whole study, and is also perhaps the one most difficult to master technically in an analysis. We have begun by classifying interaction sequences according to the number of shifts in behavior between actors they contain (which we term the number of "actor positions"). In this preliminary step, the number and the identities of the concurrent responses of each actor at every time point (position) are ignored. And all persons interacting with the infant (C) are coded as adults (A). Some examples of sequences follow: "mother approaches--S smiles" would be termed an AC (adult begins--child terminates) 2 position interaction sequence, as would be "mother approaches and talks--S smiles and vocalizes." But "mother approaches--S smiles--mother talks" would be an ACA (3 position) sequence, while "S fusses--mother picks up--S quiets down--mother hugs" would be a CACA (4 position) sequence. In this classification scheme, the number of positions and the identity of the actors beginning and terminating sequences are independent of each other and of the number and content of individual responses at each actor position. These would constitute criteria for further classification, but we need not go into such detail for our purposes here. However, we anticipate that even while interaction sequences are classified in Table 5 only by the identity of the actors and the length of sequence, for some of our theoretical purposes it would be sufficient to emphasize only the identities of the actors beginning and terminating an interaction sequence. [The 4 possibilities are: adult begins--adult terminates (A-A); adult begins--child terminates (A-C); child begins--child terminates (C-C); and child begins--adult terminates (C-A).]

Table 5 illustrates the distribution of interaction patterns for the two cases with differences that conform with several of our expectations. While there do not

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Insert Table 5 about here

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appear to be substantial differences between the Ss in the percentages of occurrence of different interaction patterns, the over-all number of interactions differs

sharply: The "Only" boy participated in more than twice as many sequences as did the "Youngest" boy. The largest proportion of interaction sequences of each was with his mother. (To our regret, the "Youngest" child's father did not appear during the observation day. We might have expected a similar difference between the incidence of fathers' interactions with their sons.) This trend is even more striking when we recall that there appeared to be no difference between Ss either on the total time during the day each spent with his mother or on the distribution of caretaking settings. Thus we see illustrated a difference between the potential and the actual availability of stimuli, and by implication, between their structural and their functional meaning. If the interaction patterns would be filled in with responses like those illustrated in Tables 3 and 4, we might conclude that the two mothers have quite different types of "relationship" with their sons. Further, the learning contingencies inherent in the interaction sequence patterns of Table 5 are the reverse sides of the coin, as it were, of the control over each other's vocal and smile behaviors, of infant and mother (and others), that is reflected in Tables 3 and 4. Those tables indicated that, relative to the "Youngest" child, the "Only" child shows a greater incidence of social behaviors, as does his environment to him. At the same time, the "Only" child may be provided with a relatively greater number of opportunities for social learning.

One of our central interests during this phase of analysis will involve the search for systematic relationships between interaction sequence patterns and response rates in non-social contexts. If, for example, the vocal responses of middle-class family infants are much more frequently reinforced, in interactions, than are those of institutional infants, we might expect to find a difference in the rate of vocalizations of both groups, in and out of social and interaction contexts. And this difference could increase with age. Relationships such as this one would be relevant to our basic theoretical assumption (which is but a corollary of the conception of learning) that selected classes of environmental stimuli could have an impact (in

behavior) as a function not simply of whether they are available, but also of whether they are provided in effective contingencies with the infant's behavior.

To conclude our comments on the technical aspects of the interaction analysis, we do plan to analyze closely the response content of interaction sequences as well as their form. Thus, we are interested in whether there is a tendency for specific infant or adult response classes to occur together, e.g., whether smiles evoke smiles and what the probability is of adult talk being followed by an infant's vocalization, whether physical-contact stimuli constitute more potent or effective reinforcers than visual events, what are the conditions under which vocal responses accompany smiles, and similar issues. We are involved at the moment in the complicated task of developing a method for response sequence analysis in adult-child interaction.

As you may have guessed by now, one of the underlying emphases in our classification of interactions is our assumption that classical (Pavlovian) and operant conditioning patterns may be differentially implied in the interactions between infants and caretakers in diverse environments or in different settings of the same environment. We would expect that the institutional infant must work harder (i.e., exhibit more frequent and discriminable operant responses) for the attention of the caretaker, competing with other infants as well as with other responsibilities of his busy caretaker. Further, we would expect fewer interactions in the institution than in the other environments, and would imagine that proportionately more interactions in the institution (e.g., in frolic play) involve eliciting stimuli. Hence, the acquisition and performance implied there would be more of the Pavlovian than of the operant type. "Pavlovian play" might often emerge in situations where a caretaker, however well-intentioned, has limited time available to interact. Her behaviors to the infant would be a function more of this limited time than of what he might be doing at any moment. She might approach the infant during her brief free periods, and flood him with contact and similar proximal stimulation, to which he might respond wildly. (But as she typically must soon leave, the infant would soon be left "up in the air.") In both middle-class family and kibbutz there may be relatively more

"operant play." That is, responses to the infant's initiations would comprise interaction chains often terminated by the adults' reinforcing response. Also, there may be more instances where adult initiations are answered or terminated by the infant's response, which could be reinforcing for the adult's behaviors. We might even pick up some of these differences between the two middle-class families. The mother of the "only" child, who can hardly wait until her baby wakes to play with him, might show a different quality of interaction with him (e.g., intensity), and might be much more likely to reinforce his initiations, than the busier and perhaps more relaxed "multiple" mother who might be happy to have her baby sleep as long as possible, and might frequently leave him in a room alone for long periods, unless he would be in distress.

SUMMARY

We have illustrated our purpose in attempting, in four diverse child-rearing environments in Israel, a functional analysis of the conditions of environmental stimulation, and their effects, particularly in the social behavior of developing infants. When our aim would be achieved, we shall have defined functionally differences among these child-rearing environments, not in terms of global, remote or inferred constructs, but in terms only of the different patterns of stimuli they provide in relation to the capacities and the behavior repertory of the developing infant. We expect an analysis like this one would be useful for the understanding of the psychological processes underlying the effects of child-rearing. But we would hope to illustrate the potential fruitfulness of our approach to the complexities of the phenomena of human interaction, even in an observation study carried out in a life-setting as is this one. This study employs elementary stimulus and response units, and the basic conceptions of learning. While we think that the underlying processes thus identified in the main could best be validated under controlled, stripped-down, laboratory conditions, assessments and analyses based on observational studies such as this one have a definite place. Variables which might most fruitfully be

experimented upon could be identified in the very "real life" situations (with all their variability and complexity) to which the laws best isolated in the laboratory would ultimately be generalized. These approaches of laboratory and of systematic naturalistic observation are complementary for an understanding of the processes involved in human social learning.

REFERENCE

Gewirtz, J. L. (1961) A learning analysis of the effects of normal stimulation, privation and deprivation on the acquisition of social motivation and attachment. Pages 213-299 in B. Foss (Editor), Determinants of Infant Behaviour. I. London: Methuen; New York: Wiley.

Table 1

Daily Schedule: Frequencies and Durations of Mother's Caretaking in Settings

	"Youngest" Child		"Only" Child	
	Number of Periods	Total Time (minutes)	Number of Periods	Total Time (minutes)
Total Time Observed	--	676	--	800
Sleeping	2	166	3	294
Awake	--	510	--	506
Setting				
Feeding	5	53	5	43
Eating (S by himself)	1	5	--	--
Changing diapers	5	13	6	17
Dressing	3	7	2	7
Bathing	--	--	1	4
Outing	2	60	--	--
Playing	--	--	6	7
All Settings	--	140	--	80
Time Awake less Settings	--	370	--	426

Table 2

Background Events: Frequencies and Durations of Visits by Persons in Infant's Vicinity

	"Youngest" Child		"Only" Child	
	Number of Visits	Total Time (minutes)	Number of Visits	Total Time (minutes)
S's Time Awake				
S awake	--	510	--	506
S alone	--	166	--	170
Mother alone with S	--	29	--	161
Visitors				
Mother	22	298	41	276
Father	--	--	5	96
Sister	11	153	--	--
Visitor A	--	--	8	49
Visitor B	3	97	3	26
A child	2	90	1	42
An infant	2	105	--	--

Table 3

Frequencies of Adult Smile and Talk Responses to S During the Day

	"Youngest" Child						"Only" Child					
	By Mother		By Others		Total		By Mother		By Others		Total	
	Talks	Smiles	Talks	Smiles	Total	Smiles	Talks	Smiles	Talks	Smiles	Talks	Smiles
In Interaction	75	23	24	11	99	34	218	127	68	35	286	162
Outside Interaction	--	1	--	--	--	1	32	2	5	--	37	5
Total for Day	75	24	24	11	99	35	250	129	73	35	323	167